U. S. DEPARTMENT OF ENERGY
WORK BREAKDOWN STRUCTURE DICTIONARY
PART II - ELEMENT DEFINITION

1. PROJECT TITLE/PARTICIPANT Environmental Management/Bechtel Jacobs Company LLC	**2. DATE** 10/01/02	**3. IDENTIFICATION NUMBER** DE-AC05-98OR22700
4. WBS ELEMENT CODE 1.12.04.01.01.13	**5. WBS ELEMENT TITLE** PAD Groundwater Operable Unit	
6. INDEX LINE NO. N/A	**7. REVISION NO. AND AUTHORIZATION** Rev 5	**8. DATE** 7/8/03
9. APPROVED CHANGES N/A		
10. SYSTEM DESIGN DESCRIPTION N/A	**11. BUDGET AND REPORTING NUMBER** N/A	

12. ELEMENT TASK DESCRIPTION

WBS GRAPHIC

See attached.

INTRODUCTION

In 1988, widespread contamination of groundwater by trichloroethene (TCE) and technetium-99 (Tc-99) around the Paducah Gaseous Diffusion Plant (PGDP) was detected. Subsequently, remedial investigations were performed to determine the extent of groundwater contamination at PGDP. Results of these investigations detected the presence of dense non-aqueous phase liquid (DNAPL) onsite and up to four dissolved-phase plumes (northeast, northwest, southwest, and Technetium-99 plume) outside the facility fenceline. As a result of the remedial investigations and baseline risk assessment performed for the groundwater operable unit (GWOU), the following groundwater problem statements have been developed.

- TCE exists as DNAPL in two main areas at the C-400 Building. TCE is found in both the upper continental recharge system (UCRS) and the RGA at the C-400 Building. The TCE DNAPL must be reduced, removed, or contained before it is possible to return the groundwater back to beneficial use.
- TCE and its degradation products exist at lower concentrations throughout the dissolved-phase plumes both on and off U. S. Department of Energy (DOE) property. These dissolved concentrations must be reduced before the groundwater at or around the PGDP can be brought back to beneficial use.
- Dissolved-phase TCE and Tc-99 are discharging to surface water in Little Bayou Creek in the off-site area. These releases must be contained or eliminated to remove direct contact risks to human health and the environment.

DOE's strategy for groundwater restoration at PGDP assumes complete restoration is technically impracticable, i.e. compliance with Applicable or Relevant and Appropriate Requirements is impracticable from an engineering standpoint, particularly in relation to achieving a performance standard of reaching maximum contaminant levels in impacted groundwater. Therefore remedial action objectives for PGDP include 1) reducing imminent risk to human health and the environment, 2) establishing source control, whereby active sources to groundwater contamination are removed or are reduced to acceptable levels, 3) stopping plume growth by providing containment of contaminant migration, and 4) conducting monitored natural attenuation.

To ensure that there are no imminent unacceptable risks, DOE established a "water policy box" to protect the

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public from use of impacted groundwater. Residences located within the policy box signed agreements with DOE and were provided potable water. However, these agreements are expiring and attempts to renew the agreements have met with some resistance.

Establishing source control is complete when the design, construction, and operation of source removal technology(s) are implemented. The focus of aggressive source removal at PGDP is the C-400 building area. Remedial investigations at PGDP have revealed that soil and groundwater at the C-400 building area contain the highest concentrations of TCE observed to date. Applying aggressive remedial action technology (ies) within this area will have the greatest impact on contaminant mass removal and risk reduction. Effective mass removal is predicted to accelerate the rate of natural attenuation of the remaining dissolved phased plumes downgradient and offsite of the PGDP. The final phase of source control is implementing monitored natural attenuation. Monitored natural attenuation would be used to document protectiveness of human health and the environment and to measure the effectiveness of the source removal actions.

Stopping plume growth, or containment, provides a means of minimizing the volume of groundwater impacted by contamination. The current P&T systems contain the high concentration areas of the Northwest and Northeast plumes. However, P&T systems typically are maintained for long periods and result in extremely high operation and maintenance costs. An alternative in some areas of the site may be phytoremediation, which utilizes plants to uptake and either fix or destroy contaminants in groundwater. This alternative is limited to areas with very shallow groundwater (less than 25-ft).

Establishing source control and plume containment will ensure short-term and long-term protectiveness of human health, a reduction of the toxicity, mobility or volume of contaminants, and restoring groundwater to the most beneficial use.

Paducah GWOU includes work scope outside of source control actions. This scope includes sub-project task management and integration, a phytoremediation deployment, groundwater modeling, closure of data gaps in the existing northeast plume monitoring network, a site investigation surrounding the C-746-S&T Landfills, well abandonment and replacement at the C-746-S&T, and U Landfills and northwest plume, and DOE prime. The GWOU is composed of 7 sub-project tasks. Work Breakdown Structure (WBS) element numbers assigned to the sub-project tasks are:

WBS 1.12.04.01.01.13.01 – Technical Management and Integration
WBS 1.12.04.01.01.13.02 – Modeling
WBS 1.12.04.01.01.13.03 – Characterization
WBS 1.12.04.01.01.13.04 – Well Abandonment and Replacement
WBS 1.12.04.01.01.13.07 – DOE Prime
WBS 1.12.04.01.01.13.08 – Phytoremediation Deployment

LOGIC RELATIONSHIPS

- The groundwater operable unit actions will be performed in conjunction with fenceline actions and source removal actions at C-400 (TCE source) to restore the site area groundwater to the most beneficial use.
- The monitoring associated with the GWOU actions would carry over into the long term S & M program.

SCOPE DESCRIPTION

The objective of this subproject is to perform CERCLA treatability studies, RI's, FS's, PP's, RODs and

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groundwater modeling for the GWOU and is part of the overall strategy for ultimate restoration of groundwater to contamination levels which are protective of human health and the environment. The GWOU consists of the groundwater plumes on and offsite. The GWOU work elements combined with onsite source area actions represent the overall removal strategy for the GWOU.

Release Sites and Facilities

Assessments to be completed
N/A
Actions to be completed
N/A

Past and Future Accomplishments

Past Accomplishments

04.01.01.13.02 – Modeling

- Provided database support to the US Army Corps of Engineers (USACE) for their development of the groundwater modeling system (GMS) for PGDP.
- Attended Quarterly Meetings and Completed Training in Operation/Use of the USACE GMS.
- Summarized Groundwater Transport Models and Model Parameters and Values used at PGDP.
- Completed Groundwater Model Study of Distribution Coefficients for TCE and Tc-99.
- Initiated Groundwater Model Study of Geochemical Parameters for Metals and Radionuclides.
- Completed Cost Estimate for the Comprehensive Water Budget Analysis.

04.01.01.13.03 - Characterization

- Completed D0 Scoping Document for C-746-S&T Landfills.
- Completed Annual Groundwater Report with Updated Plume Maps and potentiometric surface maps based on Calendar Year 2001.
- Initiated monitoring well corrosion protection study report.

04.01.01.13.04 – Well Abandonment and Replacement

- Completed Abandonment and Replacement of Compliance Monitoring Wells at the C-404 Landfill.
- Completed Abandonment and Replacement of Monitoring Wells at the NW Plume Area.
- Completed Replacement of Compliance Monitoring Wells at the C-746-S&T Landfills.
- Completed Abandonment and Replacement of Compliance monitoring wells at the C-746-U Landfill.

04.01.01.13.06 – C-Sparge™ Treatability Study

- Completed Planning Documents for C-Sparge™.

Future Accomplishments

04.01.01.13.01 - Technical Management and Integration

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- Project Management
- Support from Groundwater Operable Unit Program Manager.

04.01.01.13.02 – Modeling

- Maintain USACE GMS model for the PGDP.
- Produce Quarterly Modeling Reports.
- Procure and maintain GMS server.
- Complete Groundwater Model Study of Geochemical Parameters for Metals and Radionuclides.

04.01.01.13.03 – Characterization

- Evaluate Tc-99 concentration trends in monitoring wells identified in the Northeast Plume Containment System Operations and Maintenance Plan.
- Develop Annual Potentiometric Surface Map for the RGA and include into Annual Updated Plume Maps for TCE and Tc-99 for subsequent Calendar Years as a result of a DOE headquarters requirement.
- Complete D1 Scoping Document for C-746-S and C-746-T landfills.
- Complete D0, D1, and D2 RI Work Plan for C-746-S & T Landfills.
- Evaluate two quarters of groundwater analytical data for C-746-S&T landfills monitoring wells.
- Prepare Site Investigation Work plan for C-746-S & T Landfills
- Execute the site investigation study
- Prepare site investigation report (D0, D1, and D2)
- Complete monitoring well corrosion protection study report.

04.01.01.13.04 – Well Abandonment and Replacement

- Complete Abandonment of Compliance Monitoring Wells (5) at the C-746-S&T Landfills.
- Install 3 RGA monitoring wells along Metropolis Lake Road.

04.01.01.13.07 –DOE Prime

- DOE funding source for disposal of liquid and solid waste generated from removal actions and treatability studies at DOE sites.

04.01.01.13.08 – Phytoremediation Deployment

- Prepare planning documents for a phytoremediation deployment at the C-746-K Landfill.
- Procure and perform a phytoremediation deployment at the C-746-K Landfill.
- Prepare a report (D0,D1,and D2) for the phytoremediation study.

Scope Description

04.01.01.13.01 Technical Management and Integration

Technical Management and Integration activities include the technical, subcontract, and project management necessary to ensure that all activities in the WBS elements are completed on schedule, within budget, and

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without safety or environmental incident. Technical Management and Integration includes the Project Manager, Safety Advocate, Subcontract Technical Representative, and Project Controls personnel who will perform project management, subcontractor oversight, ES&H support, and project scheduling and estimating. Other BJC/M&I support activities will be captured in individual WBS elements.

Baseline Change Proposals – Prepare BCP documentation to make necessary corrections to the previous FY baseline when scope, schedule, or cost changes are determined necessary.

Specific activities include:

- Ensure completion of all activities within the subproject is in compliance with the principals of Integrated Safety Management.
- Maintain contact and open communications with the appropriate DOE Project Manager on the subproject activities.
- Participate in biweekly technical information and monthly Project Status Review meetings to provide the DOE with project status summaries.
- Manage the subcontracts and work authorizations issued to complete the work under the subproject.
- Respond and supply information to DOE for Lessons Learned, surveillance and audits, Site-Specific Advisory Board support, and other DOE reporting mechanisms.
- Maintain the monthly subproject estimates and estimates at completion.

04.01.01.13.02 – Modeling

Maintain the USACE GMS and complete Quarterly Groundwater Modeling Reports. The GMS will be maintained on a monthly basis by updating simulations and the conceptual model components using newly acquired analytical, water level, and geological data.

Complete Groundwater Modeling Study of Geochemical Parameters for Metal and Radionuclides. The purpose of this study is to develop site-specific and site-wide Kd values for metal and radionuclides in the UCRS and RGA. The current Kd values used in modeling efforts are literature based. To develop site-specific and site-wide Kd values, geochemical modeling will be performed using observed groundwater and soil chemistry data for the UCRS and the RGA. The resulting site-specific Kd values will be used to more accurately define cleanup goals, waste acceptance criteria, and assist in the remedial design phase of selected remedies for all operable units.

04.01.01.13.03 – Characterization

Perform an evaluation of Tc-99 concentration trends in monitoring wells associated with the Northeast Plume Containment System (NEPCS) Operations and Maintenance Plan. This evaluation is performed to detect upward Tc-99 concentration trends in the monitoring wells, which may signal the need to implement the contingency plan for the NEPCS. A quarterly evaluation of Tc-99 trends in the 13 monitoring wells identified in the Operations and Maintenance Plan will be performed. This evaluation will include plotting concentration trends and comparing the observed concentration with the >50 pCi/L action level identified in the plan.

Evaluate two quarters of groundwater monitoring data from the new monitoring wells at the C-746-S & T Landfills.

Prepare D0, D1, and D2 Site Investigation Work Plan. The scope of the plan is to evaluate the C-746-S & T Landfills as a source of groundwater contamination and to support a decision whether to proceed with an RI/FS

for the landfills.

Perform site investigation. This investigation would involve collection of groundwater samples from the RGA for the analysis of volatile organic compounds and ^{99}Tc. A mixture of temporary and permanent (monitoring wells) sampling points will be used to collect the groundwater samples.

A site investigation report (D0,D1, and D2) will be prepared to document the results of the investigation and to provide a recommendation with regard to the need for an RI/FS.

Complete the annual Trichloroethene and Technetium-99 Groundwater Contamination in the Regional Gravel Aquifer report.

Develop annual potentiometric surface map for the RGA. The data would assist in understanding the hydrogeology of the RGA, contribute to groundwater model calibration, and allow assessment of monitoring system effectiveness for delineating contaminant movement in the groundwater. Groundwater potentiometric surface maps and hydrographs would be included into the annual TCE and Tc-99 plume maps report referenced Above.

Complete the Monitoring Well Corrosion Protection Study report. Corrosion of well riser pipe has been observed in groundwater monitoring wells constructed of stainless steel. This task evaluates options for cathodic protection of groundwater monitoring wells.

04.10.01.13.04 Well Abandonment and Replacement

Complete abandonment of 5 compliance groundwater monitoring wells at the C-746-S&T landfills.

Install 3 RGA groundwater monitoring wells along Metropolis Lake Road. These wells will be installed to close data gaps in the existing northeast plume groundwater-monitoring network.

04.01.01.13.07 –DOE Prime

DOE funding source for disposal of liquid and solid waste generated from the treatability studies and removal actions.

04.01.01.13.08 – Phytoremediation Deployment

Prepare D0, D1, and D2 work plan for C-746-K Landfill phytoremediation study. Work plan would include: sampling and analysis plan, health and safety plan, waste management plan, and data management plan. The work plan would also address up-front characterization sampling and development of operation and maintenance guidance for the phytoremediation study.

The phytoremediation deployment would be started upon approval of the work plan. The first step of the study would be to perform a limited characterization, to more clearly define the width of the study area. A total of 20 direct push groundwater samples would be collected to define the study area. The study would involve planting a 500-ft long strip between the C-746-K Landfill and Little Bayou Creek. Rows of either popular (*populus* spp.) or willow (*salix* spp.) trees would be planted along this strip. Holes would be augered to approximately 10 ft and backfilled with amendments to ensure a clear pathway for root development to the watertable. Four shallow monitoring wells (one upgradient and three downgradient) would be installed to evaluate the effectiveness of

treatment. The study would involve collecting groundwater samples from the monitoring wells (analyzing for VOCs) on a quarterly basis for one year.

Upon completion of the phytoremediation deployment, a completion report (D0,D1, and D2) will be prepared. This report will document the initial findings of the study. Since the trees represent a semi-permanent system, recommendations for continued monitoring will be included in the completion report.

Safety and Health Work Performance

Introduction to the section

It is the core value of Bechtel Jacobs Company that the safety and health of every worker and the public at large, and our environment, are the most important assets we are entrusted to protect. To accomplish this, an Integrated Safety Management System (ISMS), based on DOE's ISMS has been implemented that incorporates the five core functions and is based on the seven guiding principles. The objective of ISMS is to systematically integrate safety and environmental protection into the planning and execution of all work activities. The term safety encompasses Nuclear Safety, Industrial Safety, Industrial Hygiene, Occupational Health, Health Physics, and environmental issues. ISMS requirements flow-down to Bechtel Jacobs Company subcontractors. The Five Core Functions are: (1) Define the scope of work, (2) Analyze hazards, (3) Develop and implement hazard controls, (4) Perform work within controls, and (5) Provide feedback and continuous improvement. The Seven Guiding Principles are (1) Line Management Responsibility for Safety, (2) Clear Roles and Responsibilities, (3) Competence commensurate with responsibility, (4) Balanced Priorities, (5) Identification of Safety Standards and Requirements, (6) Hazard Control Tailored to Work Being Performed, and (7) Operations Authorization.

For FFA Documents

In performing the analysis of alternatives against the CERCLA nine criteria, consideration is given to the principles of ISMS. Specifically, in the analysis of "implementability" and "short-term impact", a trade-off assessment is performed to balance the risk to workers compared to the overall benefit of the project. This assessment follows the five core functions of ISMS to assure that the scope of work and the specific steps to carry out the project have been defined in sufficient detail to analyze the associated hazards, the effectiveness of the controls, and the actual risks to the workers.

Before a subproject begins, several activities must be completed that demonstrate that all involved in the project have completed rigorous health and safety reviews and that all potential hazards of doing the work have been identified. The routine activities in RA are conducted in accordance with standard operating procedures, activity hazard analyses, and Integrated Safety Management plans. Non-routine work will require a readiness assessment as necessary to ensure complete health, safety, and environmental reviews prior to work start. This assessment is conducted by people, experienced in similar kinds of work, with the right to examine all aspects of a project about to commence, and require that the project team provide documented evidence that any applicable requirements of the job have been met.

REQUIREMENTS/DRIVERS

Bechtel Jacobs Company LLC Contract DE-AC05-98OR22700, December 18, 1997
Integrated Safety Management System Description, BJC/OR-87, Revision 2
Paducah Gaseous Diffusion Plant RCRA/HSWA Permit Number KY8-890-008-982
Site Management Plan for PGDP, Fiscal Year 00 Annual Revision, November, 1999
"Integrated Safety Management System Description, BJC-GM-1400, Revision 2, October 2001 and Integrated

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Safety Management System Supplement, BJC-GM-1401, Revision 0, December 2000"
As applicable, indicate other regulatory-related requirements.
CERCLA: Y RCRA: Y DNFSB: N DOE Orders: Y AEA: N UMTRCA: N State: Y Other: Y

WASTE VOLUMES

Please see attached waste performance metrics, as applicable.
The waste quantities supporting the method of accomplishment and basis of estimate are consistent with data reported on the Waste Performance Metrics Form.

PROJECT SCHEDULE

Please see attached project summary schedule, project detail schedule, and Milestone Status Summary Report.
Schedule Assumptions:

EXECUTION YEAR BASELINE
Please see attached Budgeted Cost of Work scheduled Plan

BASELINE BY YEAR
Please see attached Baseline by Year Report.